

**Activity:** **4.6  
Develop Project Test Plan**

**Responsibility:** Project Manager

**Description:** The Project Test Plan is a narrative and tabular description of the test activities planned for the project. The Project Test Plan should establish the testing necessary to validate that the project requirements have been met and that the deliverables are at an acceptable level in accordance with existing standards. The plan also ensures that a systematic approach to testing is established and that the testing is adequate to verify the functionality of the software product.

The Project Test Plan includes the resources, project team responsibilities, and management techniques needed to plan, develop, and implement the testing activities that will occur throughout the lifecycle. If individuals outside of the project team perform system and acceptance testing, the plan includes the responsibilities and relationships of external test groups.

In this stage, the plan is written at a high level and focuses on identifying test methodologies and test phases. Detailed information about test products (i.e., test plans, test procedures, and test reports) is added to the Project Test Plan as the project progresses through subsequent lifecycle stages.

Development of the Project Test Plan is the responsibility of the project manager. If a test group outside the project team will be involved in any test phase, the project manager must coordinate the Project Test Plan with each test group.

The Project Test Plan must be reviewed and approved by the system owner prior to conducting any tests.

Preparation of the Project Test Plan involves the following tasks.

- 4.6.1 Identify Test Methodologies
- 4.6.2 Identify Test Phases
- 4.6.3 Identify Test Environment Requirements

**Note:** For small software projects, a formal Project Test Plan may not be necessary; however a test approach and testing are required.

<b>Work Product:</b>	<p>When the Project Test Plan is complete, it should contain the following information:</p> <ul style="list-style-type: none"><li>• Describe the occurrence and timing of the test phases in the lifecycle and the entrance and exit criteria for each test phase.</li><li>• Specify the test products at each test phase. Describe the types and scope of the testing activities to be performed on each component of the application and the group who is responsible to produce them.</li><li>• Map what requirements are verified in what test phase.</li><li>• Establish the criteria for evaluating the test results of each test phase.</li><li>• Make an initial determination of the resources necessary to accomplish the testing.</li><li>• Identify the appropriate person or group to conduct each type of testing activity.</li><li>• Outline the test environment (hardware, software, test tools, and data) needed to conduct the tests.</li><li>• Develop a preliminary schedule for executing the test activities.</li></ul> <p>Place a copy of the Project Test Plan in the Project File.</p>
<b>Review Process:</b>	<p>Conduct structured walkthroughs to assure the Project Test Plan document adequately describes all testing activities, test schedules, test products, test responsibilities, the testing methodology, and the required resources.</p>

**Task:** **4.6.1**  
**Identify Test Methodologies**

**Description:** The Project Test Plan should specify the testing methodologies planned for the project including the types of tests required, test documents, test methods, and test data collection. Each test from unit through acceptance testing is specified in terms of entrance and exit criteria and the expected level of involvement from the project team, test group, and other functional areas.

Unit and integration tests with appropriate data must be developed to exercise and validate all specified application requirements, functions, and objectives. System and Acceptance tests validate that the integrated system meets the requirements.

Each type of test must use controlled computer generated or live data as specified. The test data must be prepared to include values that will verify the functional capabilities of the software test component, identify its limitations and deficiencies (if any), exercise its capabilities, and verify that the software component performs its intended function as required.

If pilot testing or a phased implementation is required for the software product, the Project Test Plan should include such requirements. In the case of an implementation involving phased software releases, the plan should include the requirements for regression testing of the complete application as new elements are introduced.

For each type of test conducted, the test results are compared with the expected results. Discrepancies are identified and any problems resolved. Retesting is required to verify that the problem solution eliminates the problem and does not introduce new errors. The final test results are accompanied by a completed test results/error log form. This form is completed by the individual(s) responsible for testing and attached to the documents that certify the completion of each type of test.

**Task:** **4.6.2**  
**Identify Test Phases**

**Description:** The software product should be tested in four sequential phases: unit, integration, system, and acceptance. Some projects may require additional types of tests (such as prototype testing for offsite installations). The four test phases and prototype testing are described below.

**Unit Test**  
**Phase:**

The unit test phase involves testing of the individual software units or groups of related units. A unit is a component that is not subdivided into other components; it is a logically separable part of a computer program. Evaluate each unit of code on how well it meets the performance requirements for which it was designed. Consider timing, memory, accuracy in producing numerical and logical results; and the preparation of input and output required for validating program logic, syntax, and performance requirements. This test phase is performed by the programmer(s) responsible for writing the code.

**Integration**  
**Test Phase:**

Integration testing is an orderly progression of testing in which software elements, hardware elements, or both are combined and tested to evaluate the interaction between them. Each program/module must be tested. Integration testing is required to validate that groups of related programs, when combined to establish an integrated functional module of code, interface properly, and perform the software functions for which they were designed. Examine the source program/module statements to ensure that the program logic meets the requirements of the design and that the application satisfies an explicit functional requirement. This test phase is performed by the project team.

**System Test**  
**Phase:**

The system test phase tests the integrated hardware and software to verify that the software product meets its specified requirements and operates successfully on the host platform. This test phase is required to validate, when the entire software product is loaded onto the host platform, that the proper initialization is performed; decision branching paths are appropriate; and all software functions are performed as specified in the Software Requirements Specification. System testing validates that the software product produces the required outputs and interfaces properly with other systems with which the software product gives or receives data; that transaction response times meet user expectations; and machine resource allocation and utilization are within expected norms. This test phase can be performed by the project team or by an independent test group with support from the project team.

***Acceptance  
Test Phase:***

Acceptance testing is conducted to determine whether a software product satisfies its acceptance criteria and to enable the system owner's organization to determine whether to accept the software product. The acceptance test is required to validate that the software, its related documentation, tools, and hardware, satisfy all of the specified requirements and objectives of the system owner's organization, DOE standards, the requirements specification, and the design criteria. Acceptance testing will include tests of all intrasystem interfaces; and the use of all manuals, documentation, procedures, and controls. This test phase can be performed by the project team with system owner and user observers or by system owner and user representatives with support from the project team.

***Prototype  
Testing:***

In addition to the four test phases, a prototype or site test can be used when software must be physically transported, installed, and made operational at a computer facility other than at the site(s) where the acceptance test was conducted. When required, this test is conducted at selected user location(s) that will totally test the software product under "live" conditions with users and support personnel.

**Task:** **4.6.3**  
**Identify Test Environment Requirements**

**Description:** The Project Test Plan should outline what is needed to perform testing activities throughout the project lifecycle including personnel, hardware, software, space, and other environmental requirements. As much testing as possible should be performed on the same equipment that will be used for the production system. In many cases, this information is not fully known until the System Design Stage.

The following are some of the considerations for test environment requirements.

- Evaluate automated testing tools for the following:
  - Generation of test scripts
  - Creation of result and error repositories
  - Consideration of each tool's benefits and costs
  - Use of simulators
- Determine local area network, wide area network, and metropolitan area network testing environment(s), as needed
- Determine test lab, data generation, and error correction support
- Identify Beta test sites